



Managing Covid-19 pandemic and supply chain disruptions through employee attitude: A cross-country analysis based on the transtheoretical model

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Abstract

In this paper, we examine the attitudinal changes and processes regarding Covid-19 guidelines through the lens of the Transtheoretical Model (TTM) among 932 employees in organisations within the emerging markets of China and Qatar, and the implications for the management of operations and supply chain disruptions. Exploratory and confirmatory factor analysis, and hierarchical multiple regression were conducted to validate our measures, confirm model fit, and verify the proposed hypotheses. Our findings reveal that attitude towards the guidelines differ between Chinese and Qatari samples, significantly stronger among the Chinese sample. The TTM dimensions explain a considerable amount of variance in attitude and self-efficacy. Self-efficacy further explains attitudinal changes. Firms should actively source and provide useful and accurate information about COVID 19, including pathological characteristics, propagation, prevention measures, and treatment. Besides, firms should promote the importance of following the guidelines, leaders should set examples, and encourage and empower employees to do so. With the right employee attitude and behavior, firms can manage pandemic-related disruptions within the organization and the supply chain.

Keywords Supply chain disruption · Pandemic · Covid-19 · Employee attitude · Transtheoretical model · Self-efficacy · Emerging markets

1 Introduction

In early 2020, the world began to face and combat an unprecedented challenge caused by the Coronavirus disease (COVID-19). As the major public health crisis in history (Fong et al. 2020), the novel COVID-19 pandemic has largely threatened thousands of lives around the world (Vaziri et al. 2020), affecting more than 210 countries and regions (Yu et al. 2021). Moreover, its impact on the economy and society of all countries in the world are severe and incalculable (Aguiar-Quintana et al. 2021). The COVID-19 has disrupted several industries (Baz and Ruel 2021; Ivanov 2020), such as airline industry (Belhadi et al. 2021), hotel industry (Wong et al. 2021), construction industry (Zhong et al. 2020), tourism industry (Sigala, 2020), healthcare (Oeser and Romano 2021), and food industry (Chowdhury et al. 2021). The outbreak of Covid-19 has forced factories to shut down and many businesses to close (Chowdhury et al. 2020), thus causing unprecedented disruption of the supply chain (Choi 2020; Queiroz et al. 2020), and bringing short-term challenges related to health (Donthu and Gustafsson 2020).

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To decrease the infection and transmission of Covid-19 (Tuzovic and Kabadayi 2021), WHO and national health authorities such as CDC, National Health Commission of the PRC, and Ministry of Public Health (MoPH) Qatar, have published and updated the COVID-19 guidelines, which stipulate how people can protect themselves and others during interactions in business and social environments. Expectedly, many organizations began to follow and apply the guidelines (Guzzo et al. 2021) because they regard the health of employees as the top priority. To deal with this public health crisis major changes were required in individuals' attitudes and behaviours (Liu and Mesch 2020). For example, change in employee attitude to the guidelines is important for effective prevention and control of the spread of Covid-19 (Zheng et al. 2021) within organizations and between their supply chains, and helps to predict behavior to ensure the health of employees (Laura and Dolores 2006).

However, more empirical-based research are needed (Ketchen and Craighead 2020) that provide firms and their employees evidence-based suggestions about how to navigate the pandemic (Ketchen and Craighead 2020). Moreover, the existing literature on employees' attitudes and crisis management barely focus on the health of employee (Hu et al. 2021). Importantly, different countries have different infection rates and measures to deal with Covid-19, thus, national context is an important factor for explaining the difference in how employees perceive or follow the guidelines. Few studies consider Asian countries, and the comparison between Asian countries (like China and Qatar) has received little attention (Chowdhury et al. 2021; Ndubisi et al. 2020).

Thus, to fill these gaps, this paper investigates employees' attitudes toward covid-19 guidelines, and the factors that shape employees attitudes in the Chinese and Qatari contexts. Consequently, we discuss the effects of nationality/culture. The answers to these questions could provide important theoretical and practical implications for understanding and influencing employees' attitudes to pandemic containment strategies and measures. Our study expands existing knowledge about how to protect employee health during a crisis, how organizations can encourage attitudinal and behavioral changes by employees towards the protective guidelines, and how culture/national context influences employees' attitudes.

2 Theoretical development and hypotheses

The novel coronavirus has impacted organizations and businesses globally, both directly and indirectly through the impact on their value chain. It has raised a turmoil in the supply chain due to irregular and dispersed responses from world governments (Nicola et al. 2020). This black swan event has adversely affected demand for services,

manufactured goods, oil and gas and other primary sector offerings (Nicola et al. 2020); contributed to negative stock markets return, jump in unemployment rates (Belhadi et al. 2020), and weak overall economic growth (OECD 2020).

In addition, the outbreak of the virus has resulted in major psychological effects on people. The non-stop media-induced stress, job insecurity and financial struggles along with the sheer danger of the situation have resulted in increased levels of stress. Additionally, quarantining and a major shift in routines have affected people's mental health (Lassri and Desatnik 2020). The findings of Atalan (2020) suggest that the lockdown has effect on human psychology, arguing that depression (16.0–28.0%) and stress (8.0%) were psychological reactions developed due to the pandemic. Hence, a closer study of the preventive guidelines/measures and employees' attitudes towards them, as well as the experiential and behavioural processes that drive attitudes pose as a very important exploratory study.

2.1 Trans-Theoretical Model (TTM)

The Transtheoretical model (TTM) is a comprehensive model of behavior change initially developed by Prochaska and DiClemente (1983). The model has been applied in past studies in the fields of health education, dietary behavior, physical activities and exercise, behavior of diabetes patients, and blood donation (Armitage and Arden 2011; Blaney et al. 2012). TTM constructs have four categories: (a) stages of change, (b) processes of change, (c) the decisional balance, and (d) self-efficacy (Prochaska and Velicer 1997). The stages of change include Pre-contemplation, Contemplation, Preparation, Action, Maintenance, and Termination (Sardi et al. 2019). The five stages depict a temporal dimension that allows researchers to understand and study when variations in attitudes, intentions and behavior occur (Levy 1997). In this study, we further classify TTM dimensions into Pre-Action & Maintenance and Action & Maintenance processes to help in the understanding of the drivers of attitude towards Covid-19 guidelines.

According to Prochaska and Velicer (1997), the processes of change are identified as cognitive, affective, and behavioral aspects that individuals use to assist them to change a behavior and maintain that change. They include ten processes: consciousness raising, dramatic relief, environmental re-evaluation, self re-evaluation, social liberation, stimulus control, reinforcement management, self-liberation, counter-conditioning, and helping relationships. The first five processes are regarded as Pre-Action & Maintenance processes, and the last five processes are Action & Maintenance processes. These processes can boost employees' self-efficacy (i.e. how competent they are to change), which includes their ability to perceive and weigh out the pros and cons

of changing their attitudes or behaviors (towards Covid-19 guidelines in this instance). Drawing on DiClemente and Scott's (1997) we adapt and present the definitions and interventions for each TTM dimension based on the context of this study in Table 1.

Past studies have examined and found support for the TTM over a variety of populations involving different work-site groups (such as medical, industrial, governmental, and retail), age groups, places of residence (such as countryside and urban), and medical conditions (DiClemente and Prochaska 1982). Following this convention, this paper applies a comprehensive framework depicting the relationship between the independent variables (TTM constructs) and the dependent variables (self-efficacy and attitudes towards Covid-19 guidelines) as shown in Fig. 1.

2.2 TTM, self-efficacy and attitudes towards Covid-19 guidelines

TTM has been applied to many health problems, especially, positive health behaviour change (Armitage and Arden 2011), such as physical activity, exercise (Haas and Nigg 2010; Lippke and Plotnikoff 2009), and health promotion (Prochaska et al. 2010). As a psychological framework, TTM is considered an integrative model of how people volitionally change behaviours based on knowledge, attitudes and or behaviour (Taylor et al. 2006). This TTM based study mainly includes stages of change, decisional balance, self-efficacy, and attitudes towards covid-19 guidelines. It emphasizes the link between the processes of change, self-efficacy, and attitude towards covid-19 guidelines. As the most understudied tenant of TTM, the processes of change provides the strategies and techniques to alter thoughts, feelings, and behaviours (Prochaska and Diclemente 1983).

As the most studied aspects of TTM, self-efficacy-specific self-confidence to perform the focal behaviour, draws on Bandura's self-efficacy theory (Bandura 1977). It is usually conceptualized as the intermediate/dependent measures in TTM (Velicer et al. 1998). When an individual has high self-efficacy, it signals that they can overcome obstacles and bear pressure in the process of behavioural change (Callaghan et al. 2011). Self-efficacy particularly increases with the change from stage preparation to stage maintenance (Velicer et al. 1990). It is seen as an important factor to push people to move toward the later stage of change (Lenio 2006); it can also shape attitude positively. Liu et al. (2018) found significant link between processes of change and self-efficacy and physical activity. In this study, we argue that employee's attitude towards covid-19 guidelines can be influenced by the processes of change and self-efficacy. Besides, the processes of change and self-efficacy are connected. Therefore, we propose the following three hypotheses.

H1a: There is a significant relationship between the processes of change and employee attitude towards covid-19 guidelines.

H1b: Employee self-efficacy is significantly associated with attitude towards covid-19 guidelines.

H2: There is a significant relationship between the processes of change and employee self-efficacy.

2.3 The role of nationality (China vs Qatar)

Recently, researchers have shown a growing interest in understanding the contingent factors that might advance our understanding of TTM and its outcomes (Marshall and Biddle 2001). However, most related studies focus on the comparison of sex differences (O'Hea et al. 2003); researchers have hardly studied the effect of contextual or cultural differences. Marcus and Owen (2010) discuss the differences in self-efficacy and decisional balance between Americans and Australians. Yet, there is limited research on the TTM in largely non-Caucasian societies (Callaghan et al. 2011). Consequently, we further discuss the moderating role of nationality in the relationship among processes of change, self-efficacy, and attitude, as well as a comparison of attitudes to COVID-19 guidelines between China and Qatar.

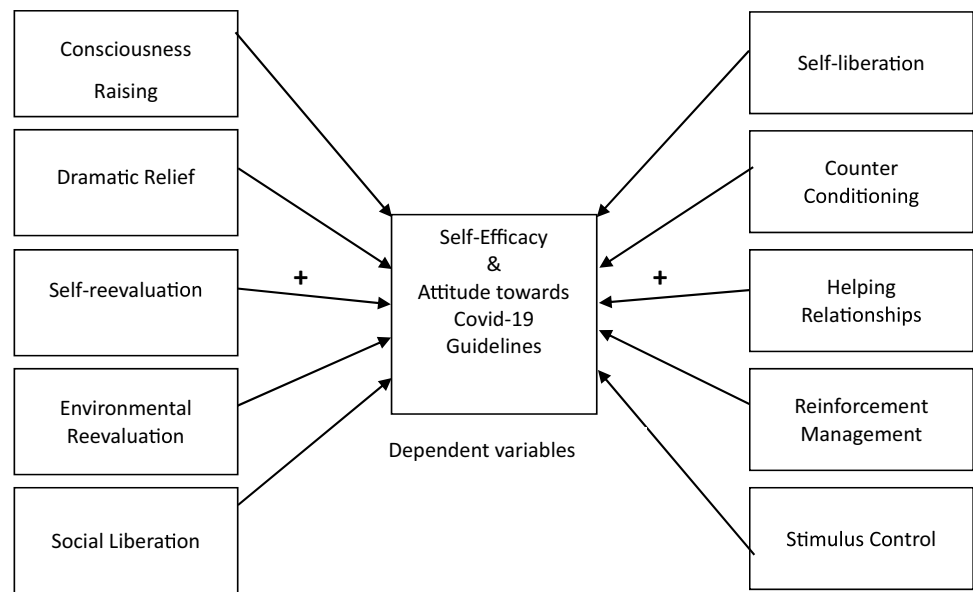
Characterized by many different value-based attitudes and behaviours, cultural differences among societies can be understood through the examination of their nationalities (Watson et al. 2002). As a crucial component of culture (Kotler and Armstrong 2010) in cross-culture research, nationality and culture are used interchangeably. Kirkman et al. (2013) assert that nationality is more salient and influential than other demographics to determine people's identities. Nationality reflects people's cultural heritage as well as their knowledge and skills (Hem et al. 2003), and values (Earley 2000). It helps to distinguish the members of one human group from those of another (Fila et al. 2016), and finally shape perceptions, dispositions, and behaviours (Muk and Chung 2015).

There are apparent differences in several dimensions of culture between Arab countries and China (Syam et al. 2011). Nationality/culture plays a role in behavior change. China is deeply influenced by Confucian culture (Ndubisi 2011), whereas Qatar has an Islamic background. The differences in culture between China and Qatar result in different thinking style and living habit, which have profound impacts on experiential and behavioral processes of change, self-efficacy, and attitudinal change. As such, the relationship between the processes of change, self-efficacy, and attitudinal change is expectedly dependent on the nationality as, social, work, cultural, and national values differ among countries. Different countries show diversity in cultural codes and norms, which in turn influence behavior (Shkoler and Kimura 2020). In this paper, we argue that attitude

Table 1 Structure and Definition of TTM

Categories	Process	Definition	Covid-19 Pandemic Study Context
Experiential Processes (Pre-Action & Maintenance Processes)	Consciousness raising	Increase information about the problem	Observation, confrontation and interpretation of guidelines, non/adoption implications
	Self-reevaluation	Assessing how one feels and thinks about oneself with respect to problem behaviour	Employee value clarification, corrective emotional experiences, challenging beliefs, and expectations of guidelines
	Environmental reevaluation	Assessing how one's problem affects the personal and physical environment	Empathy training (empathy for loved ones, acquaintances, co-workers, health system and workers, work environment, over-stretched resources, and physical surroundings)
	Dramatic relief	Experiencing and expressing feelings about one's problems and solutions	Grieving losses (of covid-related deaths and health infections), and role playing (imagining one or loved one in those unenviable situations)
	Social liberation	Increasing alternative for non-problem behaviours available in society	Advocating for the protection and rights of the vulnerable (the old, people with pre-health conditions), policy interventions, and empowering people
Behavioural Processes (Action & Maintenance Processes)	Stimulus control	Avoiding or countering stimuli that elicit the problem behaviours	Restriction of one's environment through employees avoidance of face-face meetings, close proximity, handshakes, uncovered coughing and sneezing, anti-masker and anti-vaxxer behaviours, etc
	Reinforcement management	Rewarding oneself or being rewarded by others for making changes	Self-reward, peer reward, superior reward, and other rewards for following guidelines and showing the right attitude
	Self-liberation	Choosing and committing to act or believing in ability to change	Decision making therapy, resolutions, and guidelines commitment enhancing techniques
	Counter conditioning	Substituting alternatives for anxiety related to problematic behaviours	Positive self-statements, and appreciation of the benefits of guidelines and compliance
	Helping relationships	Openness and trusting about problem with people who care	Being open and trusting with health authorities and experts, managers/superiors, family and friends who care about the employee's health and wellbeing

Fig. 1 Experiential and Behavioral Processes of Change and Outcomes



towards covid-19 guidelines and the effects of self-efficacy and change processes depend on employee's nationality.

H3a: Nationality moderates the relationship between the process of change and attitude towards covid-19 guidelines.

H3b: Nationality moderates the relationship between self-efficacy and attitude towards covid-19 guidelines.

The full research model and all related hypotheses are schematised and presented in Fig. 2.

3 Research methods

3.1 Samples and data collection

This investigation was conducted to assess employees' attitudes towards Covid-19 guidelines in two countries: China and Qatar. Participants were Chinese or Qatari citizens employed full time in Chinese or Qatari organizations (respectively) with full access to covid-19 guidelines via multiple channels of communication from within the organisation and from outside the organization (such as health authorities). Data were collected from China and Qatar on the basis of the following three reasons. First, there are limited research studies on the TTM in largely non-Caucasian societies (Callaghan et al. 2011), and even more sparse are pandemic-related comparative studies on the predictors of behaviour and attitude change based on TTM in non-western countries. Second, there is significantly different trend in total cases of COVID-19 infections in China and Qatar since Covid-19 outbreak (see Fig. 3). China was the first country in the world to be exposed to the virus, whereas

Qatar experienced the outbreak later. Third, China and Qatar are both Asian and developing countries, but both of them have unique social and economic fabric. Notably, China is the most populated country in the world, and with a culture embedded in Confucianism (Ndubisi 2011), it is culturally different from Qatar, which is one of the least populated countries in the world with Islamic culture. These similarities and differences make the two contexts appropriate, interesting, and compelling to study.

Primary data for analysis were gathered from November 2020 to December 2020. The participants were customer service employees in private sector organizations in the Education, Telecommunication, Food & Beverage, and Retail, Distribution and Logistics sectors. Participation in the survey was purely voluntary. Following the methods described by Frohlich (2002), follow-up phone calls or e-mails were made or sent to the respondents who made incomplete entries, ensuring high data quality and response rate. In the end, the efforts yielded 932 usable responses. The total sample ($N = 932$) is comprised of 496 (53%) employees from Qatar and 436 (47%) from China. The demographic profile of the respondents are presented in Table 2.

To avoid nonresponse bias, following Petersen et al. (2005) suggestion, we conducted *t*-tests to check whether there are differences between early and late respondents for all variables. The results of the *t*-test reveal that there are no significant differences between these two groups, indicating the absence of nonresponse bias in this study. Then, we examined common method variance (CMV) in two ways since CMV might pose a validity issue (Boon-itt & Wong 2011). First, we employed the Harman one-factor test to check CMV (Kotabe et al. 2003; Podsakoff et al. 2003; Podsakoff and Organ 1986),

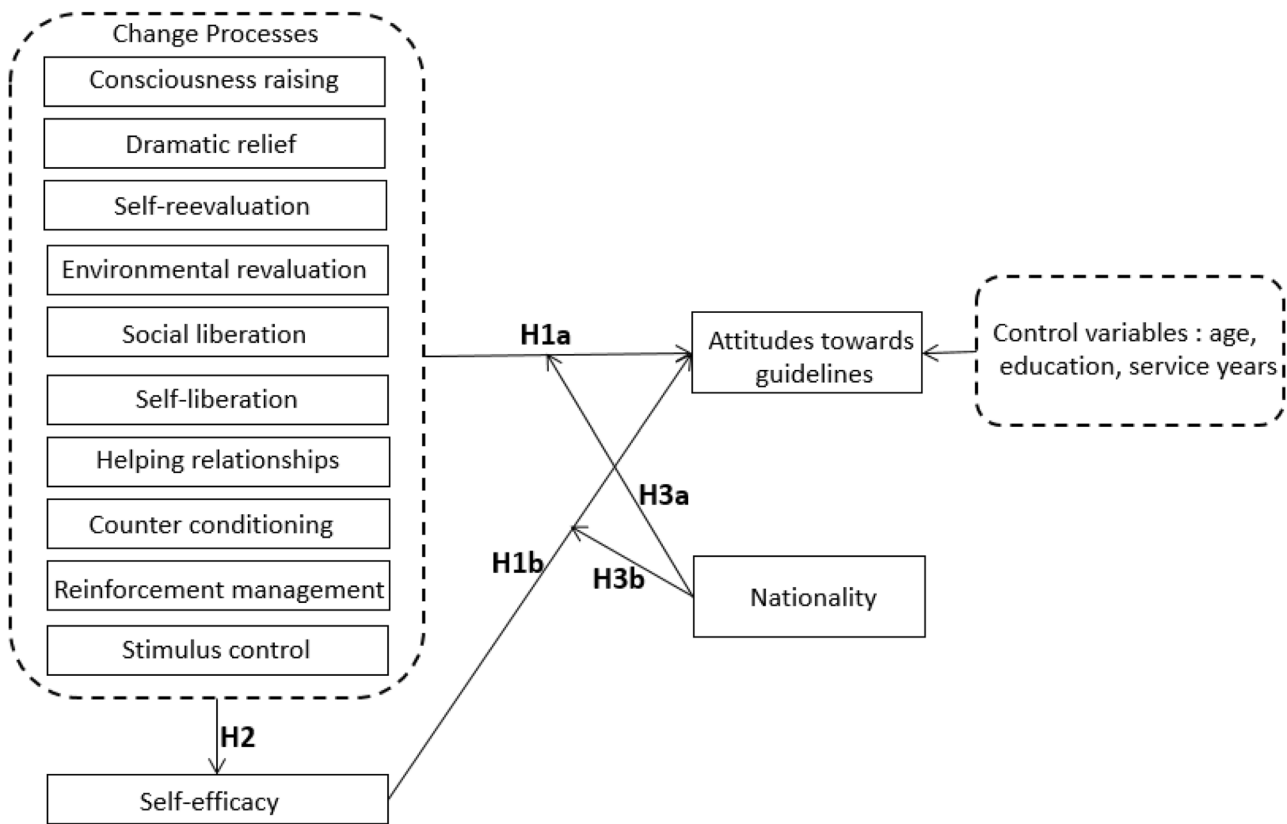


Fig. 2 Full Research Model

which yielded $\chi^2 = 16,212.781$ with 1034 degrees of freedom (compared with the $\chi^2 (713) = 3644.785$ for the CFA model). Second, CVA was also tested using the factor analysis, which identified twelve distinct factors with eigenvalues and explains

82.723 percent of the total variance. The first factor is the minority in the total variance, explaining 12.446 percent of the variance. These results can be regarded as evidence that no CMV problem exists.

Fig. 3 Total Cases of COVID-19 Infections for China and Qatar. Data source: <https://covid.ourworldindata.org/data/owid-covid-data.csv>

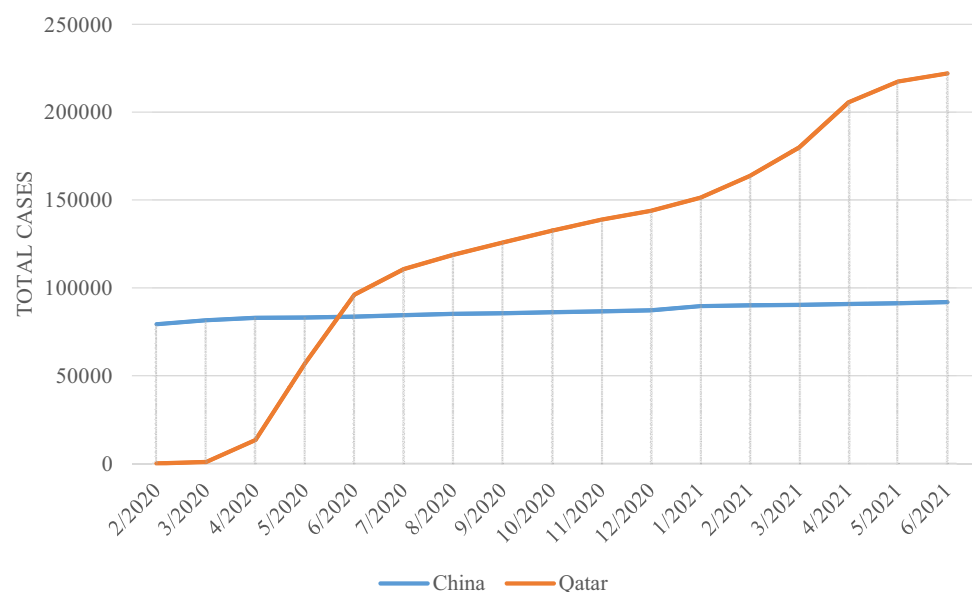


Table 2 Demographic Profiles

Total (N=932)	
<i>Gender</i>	
Male	371(39.72%)
Female	561(60.06%)
<i>Nationality</i>	
Qatar	496 (53.22%)
China	436 (46.78%)
<i>Age</i>	
< 25	115(12.34%)
25–34	432(46.35%)
35–44	261(28.00%)
45–54	85(9.12%)
55–65	35(3.76%)
> 65	4(0.43%)
<i>Education</i>	
Below Secondary	20(2.15%)
High School / Diploma	116 (12.45%)
Bachelor Degree	481 (51.61%)
Master or PhD	315 (33.80%)
<i>Service Years</i>	
< 1	176 (18.88%)
1–2	176 (18.88%)
3–4	124 (13.30%)
> 5	456 (48.93%)
<i>Industry</i>	
Education	159 (17.06%)
Food & Beverage	161 (17.27%)
Telecommunications	176 (18.88%)
Retail, Distribution and Logistics	438 (46.90%)

3.2 Questionnaire design and measures

The questionnaire was developed from existing literature. Covid-19 guidelines were adopted from WHO (2020). Following convention, attitude towards COVID-19 guidelines was measured using a scale consisting of 5 items adapted from a previous study (Payne and Payne 2004), and contextualized to WHO's (2020) guidelines. Employees' attitudes indicate the overall positive or negative evaluative judgment of the guidelines (Choi 2011). The 5 items used to measure self-efficacy were adapted from Blaney et al. (2012). The ten dimensions of processes of change of TTM were measured using 31-item measures adapted from Blaney et al. (2012). Each of the ten dimensions of processes of change was measured with multiple items. Consciousness raising (CR), denoting employees' increase in their awareness about causes, consequences, and cures of particular problematic behaviour was measured with 3 items. Dramatic relief (DR), which indicates the feeling of

emotional fluctuation that is related to unhealthy behavioural risks and future healthy behaviour benefits was measured using 4 items. Self-reevaluation defined as the cognitive and affective evaluation of self-image and consciousness of the importance of behaviour change to identity, and Environmental reevaluation (ER), the cognitive and affective evaluation of the effects of unhealthy and healthy behaviour on the others, resources and environment, were each measured using 3 items. Self-liberation (SL), personal assurance and commitment to behaviour change, and Social liberation (SoL), the recognition awareness that social norms are beneficial to healthy behaviour change and commit to action of behaviour change, were both assessed using 3 items each. Helping relationship (HR) which refers to the discovery of supportive relationships that promote the desired change and Counter Conditioning (CC), the desire to substitute unhealthy behaviour with healthy alternatives were measured using 3 items each. Reinforcement management (RM) or contingency management denotes the appreciation of the reward for healthy behaviour and punishment for unhealthy behaviour was captured using 3 items. Lastly, Stimulus Control (SC) refers to redesigning the environment to have cues that encourage the behaviour was measured using 3 items. All items were measured using a five-point Likert-scale in which respondents specify their level of dis/agreement to the statements on a 5-point scale ranging from (1) strongly disagree to (5) strongly disagree. The nationality is a dummy variable (0 = China and 1 = Qatar), which was treated as a moderating factor. Furthermore, demographic characteristics were found to be related with employee attitudes (Xiao et al. 2001), thus, several demographics were controlled for potential confounding effects such as age, education, and service years. Each demographic variable was measured by a single item.

The questionnaire was in English since the respondents were fluent in the language. As shown in Table 3, 98% of the respondents had a minimum of University or College education. Prior to the main survey, we conducted a pre-test on twenty-six respondents in Qatar and China to ensure the questions are understandable and concise, and accordingly captured the minor feedback received in the final version of the instrument. A complete list of the measurement items and scales are presented in the Appendix.

3.3 Reliability and validation of measures

We employed a reliability test and exploratory factor analysis (EFA) to realize the purification of scale. Cronbach's alpha (α) and composite reliability (CR) were used to assess each construct's scale reliability. The results presented in Table 3 show that Cronbach's alpha values (ranging from 0.700 to 0.929) and composite reliability (ranging from 0.710 to 0.929) are larger than 0.600, indicating high reliability of all constructs (Fornell and Larcker 1981).

Table 3 Reliability Estimates

Construct	Item	Factor loading	Cronbach's α	CR	AVE
Attitude towards guidelines	ATG1	0.828	0.897	0.902	0.650
	ATG2	0.849			
	ATG3	0.681			
	ATG4	0.845			
	ATG5	0.817			
Consciousness raising	CR1	0.812	0.845	0.850	0.655
	CR2	0.849			
	CR3	0.764			
Dramatic Relief	DR1	0.822	0.911	0.911	0.719
	DR2	0.864			
	DR3	0.836			
	DR4	0.868			
Self-reevaluation	SR1	0.895	0.929	0.929	0.814
	SR2	0.910			
	SR3	0.902			
Environmental reevaluation	ER1	0.853	0.874	0.877	0.705
	ER2	0.870			
	ER3	0.793			
Social liberation	SoL1	0.852	0.886	0.888	0.725
	SoL 2	0.879			
	SoL 3	0.822			
Self-liberation	SL1	0.876	0.919	0.921	0.795
	SL2	0.914			
	SL3	0.885			
Helping relationships	HR1	0.785	0.911	0.917	0.786
	HR2	0.937			
	HR3	0.930			
Counter conditioning	CC1	0.882	0.929	0.929	0.814
	CC2	0.896			
	CC3	0.928			
Reinforcement management	RM1	0.880	0.925	0.926	0.807
	RM2	0.918			
	RM3	0.896			
Stimulus control	SC1	0.858	0.784	0.817	0.606
	SC2	0.568			
	SC3	0.872			
Self-efficacy	SE1	0.747	0.802	0.808	0.584
	SE3	0.777			
	SE5	0.768			

The instrument was verified by EFA (i.e., principal components analysis, with Varimax orthogonal rotation). The results of EFA (Table 4) show the expected twelve factors explain 81.412 percent of the total variance, indicating that all items are well loaded on their constructs, thus confirming the structure of the constructs.

Construct validation was ascertained. Content validity, a non-statistical assessment of validity, was conducted through comprehensive literature searches and expert judgment and evaluation. Following the research of Narasimhan and Kim

(2002) and Worren et al. (2002), the survey instruments were adopted from existing literature that was published in top journals. We conducted a confirmatory factor analysis (CFA) to test the convergent validity (O'Leary-Kelly and Vokurka 1998). According to the results ($X^2/df=4.844$, CFI=0.929; TLI=0.918, IFI=0.929, RMSEA=0.064, SRMR=0.038), all fit indices reached the acceptable benchmark (Hu & Bentler, 1999). Furthermore, all standardized factor loadings are statistically significant and greater than 0.5 and the average variance extracted (AVE) of each construct (see in

Table 4 The Results of EFA

	Factor Loading											
	RM	DR	ATG	HR	SE	CR	SoL	SL	ER	SR	CC	SC
ATG1	0.170	0.154	0.766	0.114	0.192	0.162	0.147	0.168	0.044	0.146	-0.056	0.042
ATG2	0.220	0.173	0.780	0.075	0.177	0.138	0.136	0.141	0.164	0.082	0.038	-0.279
ATG3	0.115	0.013	0.712	0.084	0.001	0.137	0.122	0.113	0.139	-0.016	0.338	0.374
ATG4	0.301	0.155	0.710	0.106	0.099	0.229	0.122	0.077	0.199	0.128	0.036	-0.145
ATG5	0.256	0.157	0.641	0.112	0.094	0.289	0.114	0.123	0.053	0.311	0.049	0.276
CR1	0.171	0.127	0.289	0.081	0.094	0.768	0.136	0.126	0.159	0.101	0.135	-0.001
CR2	0.165	0.230	0.189	0.179	0.155	0.789	0.126	0.102	0.040	0.093	0.100	-0.071
CR3	0.137	0.343	0.215	0.122	0.247	0.621	0.089	0.138	0.066	0.109	0.020	0.162
DR1	0.193	0.743	0.136	0.219	0.202	0.248	0.092	0.078	0.083	0.084	-0.096	0.005
DR2	0.224	0.761	0.152	0.116	0.145	0.167	0.092	0.163	0.158	0.146	0.129	0.017
DR3	0.126	0.785	0.125	0.217	0.142	0.122	0.142	0.127	0.125	0.097	0.065	-0.051
DR4	0.213	0.747	0.082	0.185	0.140	0.127	0.207	0.064	0.190	0.187	0.110	0.067
SR1	0.304	0.407	0.245	0.166	0.182	0.160	0.192	0.120	0.170	0.604	0.097	-0.030
SR2	0.347	0.392	0.292	0.173	0.118	0.215	0.180	0.083	0.211	0.561	0.107	-0.011
SR3	0.261	0.349	0.277	0.192	0.178	0.181	0.220	0.239	0.184	0.613	0.012	0.026
ER1	0.217	0.460	0.158	0.123	0.222	0.124	0.210	0.146	0.582	0.194	0.115	-0.019
ER2	0.265	0.335	0.203	0.156	0.145	0.143	0.230	0.171	0.661	0.195	0.009	-0.022
ER3	0.341	0.219	0.324	0.182	0.159	0.114	0.108	0.234	0.617	0.070	0.004	0.086
SoL1	0.307	0.223	0.221	0.209	0.119	0.165	0.706	0.133	0.179	0.113	0.057	-0.011
SoL2	0.217	0.173	0.226	0.280	0.220	0.165	0.690	0.231	0.143	0.141	0.011	0.077
SoL3	0.193	0.272	0.168	0.368	0.170	0.127	0.641	0.086	0.120	0.154	0.142	-0.021
SL1	0.368	0.170	0.253	0.219	0.193	0.229	0.164	0.582	0.218	0.207	-0.016	0.084
SL2	0.403	0.217	0.257	0.190	0.202	0.190	0.236	0.601	0.171	0.130	0.011	0.017
SL3	0.324	0.235	0.278	0.265	0.178	0.179	0.174	0.574	0.263	0.148	0.089	-0.104
HR1	0.052	0.234	0.111	0.775	0.163	0.120	0.177	0.165	0.116	0.147	0.066	0.147
HR2	0.264	0.225	0.097	0.810	0.143	0.114	0.211	0.074	0.079	0.054	0.098	-0.082
HR3	0.299	0.195	0.111	0.783	0.150	0.124	0.168	0.118	0.104	0.075	0.160	-0.036
CC1	0.637	0.281	0.226	0.201	0.170	0.120	0.229	0.241	0.108	0.121	0.243	-0.052
CC2	0.552	0.265	0.229	0.133	0.236	0.142	0.180	0.317	0.113	0.148	0.335	-0.149
CC3	0.604	0.298	0.233	0.194	0.230	0.122	0.222	0.262	0.169	0.128	0.222	-0.160
RM1	0.689	0.164	0.235	0.257	0.187	0.185	0.156	0.133	0.162	0.226	0.037	0.120
RM2	0.685	0.241	0.233	0.227	0.213	0.147	0.183	0.113	0.241	0.212	0.064	-0.048
RM3	0.694	0.193	0.278	0.218	0.230	0.198	0.146	0.133	0.194	0.141	-0.034	0.175
SC1	0.232	0.187	0.150	0.101	0.694	0.178	0.156	0.254	0.121	0.194	0.167	0.025
SC2	0.160	0.136	0.113	0.327	0.284	0.222	0.094	-0.012	0.025	0.076	0.718	0.027
SC3	0.187	0.234	0.100	0.155	0.264	0.195	0.123	0.131	0.090	0.113	0.147	0.077
SE1	0.290	0.200	0.193	0.293	0.714	0.094	0.131	0.018	0.156	0.004	0.049	-0.105
SE3	0.474	0.248	0.315	0.102	0.385	0.135	0.142	0.329	0.095	0.027	-0.100	-0.049
SE5	0.447	0.226	0.283	0.088	0.796	0.188	0.183	0.431	0.146	-0.008	0.005	0.251

Table 3) exceeds the 0.50 threshold (Chen and Zahedi 2016). Therefore, strong convergent validity is confirmed (Anderson and Gerbing 1988). As for the discriminant validity, following the suggestions given by Fornell and Larcker (1981), we compared the correlation of all the constructs with the square root of AVE between each pair of them. The results in Table 5 show that the correlation between the construct and another construct is lower than each construct's square root of AVE, providing evidence of discriminant validity.

3.4 Analyses and results

First, Attitude towards the Covid-19 guidelines is significantly higher in China than in Qatar based on the results of the Independent T-test conducted to compare attitudes. The Mean and (Standard Deviation) for Attitude are respectively 4.36 (0.814) and 3.73 (0.824) for China and Qatar. These statistics are significantly higher for China than Qatar (t-value 11.67; $p < 0.001$). Given the greater devastation

Table 5 Variable Means, Standard Deviations, and Correlations

	Mean	S.D	ATG	CR	DR	SR	ER	SoL	SL	HR	CC	RM	CC	SE
Attitude towards guidelines (ATG)	4.027	0.876	0.806											
Consciousness raising (CR)	3.808	0.967	0.622**	0.809										
Dramatic relief (DR)	3.927	0.948	0.480**	0.593**	0.848									
Self-reevaluation (SR)	4.059	0.969	0.657**	0.624**	0.738**	0.902								
Environmental reevaluation (ER)	4.076	0.935	0.618**	0.557**	0.707**	0.748**	0.840							
Social liberation (SoL)	3.949	0.941	0.586**	0.560**	0.617**	0.694**	0.677**	0.851						
Self-liberation (SL)	4.174	0.892	0.663**	0.614**	0.621**	0.717**	0.744**	0.705**	0.892					
Helping relationships (HR)	3.735	1.027	0.432**	0.479**	0.577**	0.577**	0.553**	0.678**	0.593**	0.887				
Counter conditioning (CC)	4.084	0.907	0.633**	0.580**	0.649**	0.734**	0.719**	0.699**	0.775**	.613**	0.902			
Reinforcement management (RM)	4.088	0.931	0.661**	0.586**	0.621**	0.745**	0.728**	0.688**	0.794**	0.608**	0.825**	0.898		
Stimulus control (SC)	3.725	0.992	0.507**	0.597**	0.577**	0.598**	0.566**	0.599**	0.611**	0.587**	0.680**	0.635**	0.778	
Self-efficacy (SE)	4.049	0.635**	0.590**	0.613**	0.665**	0.695**	0.657**	0.769**	0.575**	0.769**	0.766**	0.714**	0.635**	0.764

Significant at: * $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$; the square root of average variance extracted (AVE) is on the diagonal

caused by Covid-19 in China, it is understandable why attitude towards remedial guidelines is more positive and stronger in China. As of December 30, 2020, reported total deaths were respectively 4,782 and 244 for China and Qatar. The figures aside, China's experience was more difficult due to the lack of knowledge on Covid-19 at the onset of it, being the first country to experience the pandemic. All these are plausible explanations for the more favourable (guidelines) attitude in China, leading to the country's effectiveness in flattening the curve and subsequent economic recovery.

The hierarchical regression was conducted to analyse the overall research model and test our hypothesis. Model 1 tests the effects of control variables (including gender, age, education, and length of service) on the attitude towards covid-19 guidelines. Model 2 and Model 3 respectively examines the effects of the processes of change and self-efficacy on attitude towards guidelines. We added nationality in Model 4, and the eleven interactions of the corresponding two variables in Model 5 to test the moderating role of nationality. Table 6 reports the results of the regression models.

Results displayed in Table 6 reveal that all the control variables in model 1 are significant, except for length of service; three control variables including gender, age, and education negatively affect the attitude of employees towards the guidelines. Model 2 in Table 6 assesses the effect of the ten processes of change and self-efficacy on attitude towards guidelines (ATG), the results show that not all independent variables have significant effect on the ATG, thus partially supporting *H1a* (counter conditioning being the only exception with $b=0.050$, $p=0.253$) and totally supporting *H1b*. Of the significant independent variables, consciousness raising ($\beta=0.279$, $p=0.000$), self-reevaluation ($\beta=0.243$, $p=0.000$), environmental reevaluation ($\beta=0.118$, $p=0.002$), social liberation ($\beta=0.079$, $p=0.028$), self-liberation ($\beta=0.114$, $p=0.007$), reinforcement management ($\beta=0.127$, $p=0.004$), and self-efficacy ($\beta=0.159$, $p=0.000$) are positively correlated with the ATG. The remaining three variables, namely dramatic relief ($\beta=-0.197$, $p=0.000$), helping relationships ($\beta=-0.083$, $p=0.008$), and stimulus control ($\beta=-0.067$, $p=0.049$) are negatively correlated with the ATG.

H2 assesses the effects of the ten processes of change on self-efficacy. The results in model 3 show that six processes of change have significant influence on self-efficacy, including self-reevaluation ($\beta=-0.057$, $p=0.082$), environmental reevaluation ($\beta=0.095$, $p=0.002$), self-liberation ($\beta=0.242$, $p=0.000$), counter conditioning ($\beta=0.167$, $p=0.000$), reinforcement management ($\beta=0.185$, $p=0.000$), and stimulus control ($\beta=0.276$, $p=0.000$). Among these six processes of change, only self-reevaluation is negatively associated with self-efficacy, the other five processes of change (Environmental reevaluation, Self-liberation, Counter conditioning, Reinforcement management, and Stimulus control) are positively correlated with self-efficacy. Meanwhile, the

effects of the remaining four processes of change on self-efficacy are not significant, including consciousness raising ($\beta=0.025$, $p=0.309$), dramatic relief ($\beta=0.041$, $p=0.163$), social liberation ($\beta=0.031$, $p=0.285$) and helping relationships ($\beta=-0.011$, $p=0.654$). Taken together, the evidence provides partial support for *H2*.

As indicated in *H3a* and *H3b* and presented Table 6, the moderating role of nationality was measured using two-way interactions in Model 5, which demonstrate that nationality both negatively moderates the relationship between dramatic relief and ATG ($\beta=-0.376$, $p=0.040$), and the relationship between counter conditioning and ATG ($\beta=-0.486$, $p=0.073$), partially supporting *H3a*. While the results also show that nationality does not moderate the relationship between self-efficacy and ATG, which does not support *H3b*.

4 Discussion and implications of the findings

4.1 Discussions

Attitude towards covid-19 guidelines seem to differ across-cultures. The findings of this study include a significantly stronger and more favourable attitude towards the guidelines in China than in Qatar. Literature is clear on the important role of user attitude in the diffusion of any innovation or idea (Beets et al. 2008; Suki 2016). That being the case, it is reasonable to expect the diffusion, demand and supply, distribution and logistics management of PPE-S (being dependent on user attitude) to be greater where user attitude is more favorable. The slightly more favorable user attitude combined with strict government control and China's past experience with 2003 SARS-associated coronavirus could partly explain why China, despite its early exposure to the virus could relatively manage the outbreak and flatten the curve faster than Qatar, despite the humongous difference in population size. The slightly weaker attitudes in Qatar and initial reluctance to volitionally adopt the guidelines meant more government controls in order to contain the spread of the virus and its economic repercussions, including greater government involvement in ensuring the adoption of PPE-S and its distribution and logistics management in Qatar.

Our results show that consciousness raising, self-reevaluation, environmental reevaluation, social liberation, self-liberation, and reinforcement management are significantly positively related to attitude towards covid-19 guidelines. Actively acquiring information and knowledge about covid-19, the opportunity for compliance self-affirmation, the positive effect of compliance on society and others, observing the positive effects of others' compliance, ability to make a personal commitment to the guidelines, and the benefits of compliance could rouse the right attitude towards covid-19 guidelines.

Table 6 Hierarchical Moderated Regression Results—standardized coefficients

	Model 1 (DV: ATG)		Model 2 (DV: ATG) H1a&H1b		Model 3 (DV: SE) H2		Model 4 (DV: ATG)		Model 5 (DV: ATG) H3a&H3b	
	b	t-value (p-value)	b	t-value (p-value)	b	t-value (p-value)	b	t-value (p-value)	b	t-value (p-value)
Constant	4.404	25.480 (0.000)	1.057	6.788 (0.000)	0.155	1.247 (0.213)	1.104	7.381 (0.000)	0.943	5.176 (0.583)
Control variables										
Gender	-0.100**	-3.085 (0.002)	-0.048*	-2.246 (0.025)	-0.002	-0.106 (0.916)	-0.001	-0.056 (0.955)	0.003	0.117 (0.907)
Age	-0.071 ⁺	-1.885 (0.060)	-0.040	-1.583 (0.114)	0.016	0.785 (0.433)	0.026	1.023 (0.306)	0.027	1.081 (0.280)
Education	-0.082*	-2.522 (0.012)	-0.035	-1.546 (0.123)	0.063**	3.464 (0.001)	-0.089***	-3.994 (0.000)	-0.089***	-3.964 (0.000)
Length of service	0.177***	4.670 (0.000)	0.057*	2.243 (0.025)	-0.019	-0.920 (0.358)	0.001	0.049 (0.961)	0.004	0.156 (0.876)
Process of change										
Consciousness raising (CR)	0.279***	9.304 (0.000)	0.025	1.018 (0.309)	0.025	1.018 (0.309)	0.205***	6.849 (0.000)	0.161 ⁺	1.717 (0.086)
Dramatic relief (DR)	-0.197***	-5.523 (0.000)	0.041	1.397 (0.163)	0.041	1.397 (0.163)	-0.112**	-3.135 (0.002)	0.117	0.986 (0.324)
Self-reevaluation (SR)	0.243***	6.068 (0.000)	-0.057 ⁺	-1.740 (0.082)	-0.057 ⁺	-1.740 (0.082)	0.285***	7.359 (0.000)	0.154	1.192 (0.234)
Environmental reevaluation (ER)	0.118**	3.076 (0.002)	0.095**	3.048 (0.002)	0.095**	3.048 (0.002)	0.090*	2.441 (0.015)	0.105	0.851 (0.395)
Social liberation (SolL)	0.079*	2.196 (0.028)	0.031	1.069 (0.285)	0.031	1.069 (0.285)	0.083*	2.410 (0.016)	0.165	1.543 (0.123)
Self- liberation (SL)	0.114**	2.711 (0.007)	0.242***	7.270 (0.000)	0.242***	7.270 (0.000)	0.076 ⁺	1.877 (0.061)	-0.046	-0.362 (0.718)
Helping relationships (HR)	-0.083**	-2.671 (0.008)	-0.011	-0.448 (0.654)	-0.011	-0.448 (0.654)	-0.092**	-3.078 (0.002)	-0.158	-1.644 (0.100)
Counter conditioning (CC)	0.050	1.144 (0.253)	0.167***	4.749 (0.000)	0.167***	4.749 (0.000)	0.019	0.445 (0.657)	0.229 ⁺	1.725 (0.085)
Reinforcement management (RM)	0.127**	2.880 (0.004)	0.185***	5.248 (0.000)	0.185***	5.248 (0.000)	0.106*	2.498 (0.013)	-0.026	-0.204 (0.839)

Table 6 (continued)

	Model 1 (DV: ATG)		Model 2 (DV: ATG) H1a&H1b		Model 3 (DV: SE) H2		Model 4 (DV: ATG)		Model 5 (DV: ATG) H3a&H3b	
	b	t-value (p-value)	b	t-value (p-value)	b	t-value (p-value)	b	t-value (p-value)	b	t-value (p-value)
Stimulus control (SC)			-0.067*	-1.969 (0.049)	0.276***	10.643 (0.000)	-0.053	-1.629 (0.104)	-0.026	-0.245 (0.806)
Self-efficacy (SE)			0.159***	3.913 (0.000)			0.168***	4.313 (0.000)	0.196	1.628 (0.104)
Moderating Variable										
Nationality (NA)					0.230***	8.904 (0.000)			0.366**	3.088 (0.002)
Two-way interactions										
CR × NA									0.092	0.537 (0.591)
DR × NA									-0.376*	-2.054 (0.040)
SR × NA									0.223	1.038 (0.300)
ER × NA									-0.021	-0.098 (0.922)
SoL × NA									-0.174	-0.884 (0.377)
SL × NA									0.246	0.940 (0.348)
HR × NA									0.158	0.955 (0.340)
CC × NA									-0.486 ⁺	-1.792 (0.073)
RM × NA									0.311	1.166 (0.244)
SC × NA									-0.044	-0.253 (0.800)
SE × NA									-0.063	-0.257 (0.797)
R ²	0.040		0.596		0.732		0.628		0.633	
ΔR ²			0.555		0.718		0.032		0.005	
F	9.717***		114.738***		245.958***		79.285***		1.089	

¹ N = 932. ***P < 0.001, **P < 0.01, *P < 0.05, +P < 0.10, ² Nationality dummy: China = 0, Qatar = 1

It is interesting though to note that not all processes of change have a positive effect on attitude. For example, dramatic relief, helping relationships, and stimulus control have a negative relation with the attitude towards covid-19 guidelines. The negative relationship between dramatic relief and attitude implies that an employee's non-compliance with the guidelines can affect the attitudes of their colleagues negatively, including the compliant ones. Since relationship with these objectors can promote a negative attitude, firms must be stricter in applying the consequences of noncompliance because of its adverse spill over effect on other employees. This is observable among anti-vaxxers and anti-maskers who have tried to corrupt the minds and attitudes of colleagues and acquaintances with their flawed ideologies. It seems that when employees observe others disregard the guidelines, they seem to get discouraged themselves from pursuing the right attitudinal changes. Therefore, organisations should guard against such negative influences in all interactions within the organization and with the members of the supply chain. Furthermore, helping relationships is inversely associated with attitude. Helping relationships means social support with the Covid-19 guidelines adoption. However, this is likely to produce a positive attitude from the individual being helped only when the support giver is knowledgeable, genuine, and trustworthy. Similarly, helping relationships can also produce a negative attitude when potential helpers or carers pay a lip service to the guidelines. It is important therefore that firms encourage employees to listen to the suggestions and recommendations of professionals and experts, and to seek help from them as well. For stimulus control, it seems that inability to access or afford PPE can lead to a negative attitude towards the guidelines. Turning to low-cost and ineffective solutions for COVID-19 pandemic prevention because of expensive personal hygienic equipment could also produce the same negative attitude. These plausibly explains the negative effect of stimulus control on attitude towards covid-19 guidelines, particularly among the poor.

Self-efficacy has a positive relationship with attitude towards Covid-19 guidelines. Self-efficacy indicates the confidence of overcoming the difficulties associated with the processes involved in attitudinal change. It is a driving force of the attitude towards Covid-19 guidelines. Self-efficacy exerts a positive influence on the attitude towards covid-19 guidelines, when employees feel confident that they can achieve the necessary attitudinal change and can navigate the processes involved successfully.

Through the moderation test, we find that nationality moderates the relationship between dramatic relief and the attitude towards guidelines, and marginally moderates the relationship between counter conditioning and the attitude towards guidelines (more so for China than Qatar). As a country that took the earliest hit by the virus, the Chinese, more so than

the Qataris, seem to be more emotionally involved when colleagues are not following the guidelines. Also, the fact that China is seen as a relatively more collectivistic society (where people are more concerned about the collective interests) than Qatar, could partially explain the stronger impact of dramatic relief on attitude among employees there. Compared with China, Qatar scores higher on individualism, so individual or immediate family feelings take priority, with relatively less involvement with others' behaviours, thus, the differential relationship between dramatic relief and the attitude towards guidelines between China and Qatar.

Higher individualism could also plausibly explain the relatively weaker impact of counter conditioning on attitude in Qatar. The import of this finding in the management of attitudinal and behavioural changes in Qatar is to emphasize the implications of positive/negative attitudinal and behavioural changes on the individual and the immediate family, whereas an emphasis on the social implications might work better in China. Authorities and policy makers in both countries (and the world by extension) can effectively stem the spread and adverse effects of the pandemic by channelling government support to individuals who show more selfless attitude and behaviours, who are mindful of and carefully consider the effects of their lifestyle on others and society in general.

4.2 Theoretical contributions

Our findings demonstrate that the transtheoretical model is not limited to health behaviour change, but also can be applied successfully in a pandemic situation to explain employees' attitudinal and behavioural changes towards Covid-19 guidelines. As far as we know, there is scarce application of the model in a pandemic situation, especially in comparing or contrasting how employees in emerging markets' organisations and their value chain would perceive or respond to set guidelines or initiatives designed to forestall a pandemic. Thus, our study expands applications of the transtheoretical model and advances existing literature by showing a viable application in semi-volition (where some guidelines are mandatory, and others are not) and a purely non-volitional (mandatory guidelines) contexts.

The study enriches the TTM theory by considering the role of culture and differences of countries. The findings of the study reveal only a partial effect of culture on attitudinal changes. Culture moderates only the relationship between two of ten processes of change and attitude to guideline. Culture is not a moderator of the relationship between self-efficacy and attitude to guideline. Even so, these findings advance current research and knowledge about the role of culture on attitudinal changes in the context of Covid-19, as well as its relevance in TTM research and application.

Despite the immense benefits of TTM, the model has its own weaknesses, in that it could not explain the results fully.

Our results show that not all processes of change have a positive effect on attitude, which is inconsistent with other research findings on the relationship between TTM constructs and attitude outcomes. The inconsistencies in findings could be the result of the unique characters of Covid-19, and regional differences. This limitation should be taken into account in future TTM studies. Nonetheless, by considering the novel context of Covid-19, this paper deepens our understanding of the TTM, and the relationship between processes of change and employee attitude.

4.3 Managerial implications

The findings of the study can be applied by managers and policy makers tasked with developing strategies for steering their organisation and society through the uncharted waters of a pandemic situation. Clearly, a large majority of organisations and economies have lost revenues and precious life of employees and citizens. The Covid-19 guidelines were created to minimise (if not eliminate) these losses. However, guidelines or policies will mean nothing in themselves if the people they were developed to help continue to have a negative attitude towards it and would not adopt or adhered to it. Given that attitudinal change is pivotal to the diffusion of the covid-19 guidelines in organisations and their value chain, informed interventions can be developed and applied based on the change drivers.

In practice, firms should actively provide information about COVID-19, including pathological characteristics, propagation, prevention measures, and treatment. Besides, firms should promote the importance of following guideline, which is very helpful in reducing infection and ensuring the health of employees. Change agents in organizations should set good example, and encourage other employees to follow guidelines. This is another way for firms to change employee attitude. However, firms should not allow the spreading of their negative feelings around the organization and over reminding of employees to follow guideline. By applying these measures, firms can ensure the health of employees and pull through difficulties of COVID 19. These findings are relevant not only to the two focal nations in this research, but are also applicable to other countries and organizations where employee attitude towards the COVID-19 guidelines needs a boost. For example, countries like US, were false narratives and denial of the real danger of this pandemic in some sectors of the government and industry have resulted in negative attitude towards the protective guidelines and consequently severe penalties to both individuals and enterprises can learn a lot from this study. They can boost employee and general public attitudes toward the guidelines by spreading factual information, and setting the right example. Honesty in communications by managers, empathy and trustworthiness by leaders, and leadership by example can

help employees and communities to weather the challenges of lockdowns and isolation, in the event of any such imposition. Organizations should discourage spreading unfounded negative information or emotions by members, and over reminding (of employees) to follow the guidelines, to avoid causing information overload and resentment. These measures can help managers to manage pandemic-related disruptions within the organization and the supply chain.

5 Conclusions and future Studies

Covid-19 is still threatening lives and incomes globally, and attitude towards Covid-19 guidelines is essential for the prevention of infection and further economic losses. Based on TTM, we unveil the key drivers of attitude towards the preventive guidelines, and advance the understanding of the role of nationality in determining attitudinal changes and change processes.

Based on data collected from China and Qatar, our study compares the relationship between change processes and attitude towards Covid-19 guidelines. China, the second largest economy and most populated country in the world was the first to experience the virus. On the other hand, Qatar is one of richest countries in the world in terms of per-capita income, small in size, a latter entrant in the league of Covid-19 infected countries, and catalyst of movement of people, goods and services during the pandemic. Both countries have different experiences and responses to the pandemic that deserve a comparative research attention like this. Qatar's key role in the global distribution and logistics management during the pandemic is well acknowledged (for example, Qatar Airways is one of a handful of airlines that remain committed to moving people and goods around the world throughout the pandemic era). These differences and similarities make for an interesting comparison of the two contexts. The findings show that attitude towards the Covid-19 guidelines is significantly higher in China than in Qatar. Moreover, the TTM dimensions such as, consciousness raising, self re-evaluation, environmental revaluation, social liberation, self-liberation, and reinforcement management have positive effects on attitude towards covid-19 guidelines, but dramatic relief, helping relationships, and stimulus control show negative effects. Moreover, employee self-efficacy has a positive effect on attitude, and self-efficacy is itself significantly related to several TTM dimensions. Furthermore, nationality moderates some of the relationships between TTM dimensions and attitude towards the guidelines.

Although the present study advances the understanding of TTM and the literature on pandemic and strategy, this study is exploratory in nature. There is a need for

more research in this area to confirm some of the findings. Future studies could replicate the present model in other sectors and contexts for purposes of generalization. Future studies could also investigate post-pandemic era to see if attitudes and their drivers have changed ex-post the pandemic. Sectors such as retail, transportation and logistics, healthcare, banking, construction, and hospitality are important suggestions for future studies.

Declarations

Conflict of interest The authors have no competing interests to declare that are relevant to the content of this article.

Appendix: The measurement items

Attitude towards guidelines (ATG)

ATG1: I think the Covid-19 guidelines are good
 ATG2: I think the Covid-19 guidelines are beneficial
 ATG3: I think the Covid-19 guidelines are not stressful
 ATG4: I trust the Covid-19 guidelines
 ATG5: I like the Covid-19 guidelines

Consciousness raising (CR)
 CR1: I read articles about COVID 19 in an attempt to learn more about it
 CR2: I look for information related to COVID 19
 CR3: I find out about new ways to keep myself protected from COVID 19

Dramatic relief (DR)
 DR1: I get upset when I see other employees not applying the Covid-19 guidelines
 DR2: I am afraid of the consequence of my health if I do not implement the Covid-19 guidelines
 DR3: I am afraid of the consequence of other health if I do not implement the Covid-19 guidelines
 DR4: I get upset when employees fail to follow the Covid-19 guidelines, which would make their lives better

Self-reevaluation (SR)
 SR1: I feel more confident when I follow the Covid-19 guidelines
 SR2: I believe that following the Covid-19 guidelines will make me a healthier, happier person
 SR3: I feel better about myself when I follow the Covid-19 guidelines

Environmental reevaluation (ER)
 ER1: I realize that if I do not follow the Covid-19 guidelines, I may get ill, and be a burden to others
 ER2: I think that my following the Covid-19 guidelines will prevent me from being a burden to the health care system
 ER3: I think that following the Covid-19 guidelines plays a role in reducing health care costs

Social liberation (SoL)
 SoL1: I have noticed that many employees know that following the Covid-19 guidelines is good for them

Attitude towards guidelines (ATG)

SoL2: I have noticed that more employees are following the Covid-19 guidelines as part of their lives
 SoL3: I have noticed that my superiors often publicize the fact that they follow the Covid-19 guidelines

Self-liberation (SL)
 SL1: I make commitments to follow the Covid-19 guidelines
 SL2: I believe I can follow the Covid-19 guidelines
 SL3: I tell myself I can keep following the Covid-19 guidelines if I try hard enough

Helping relationships (HR)
 HR1: I have a colleague who encourages me to follow the Covid-19 guidelines when I do not feel up to it
 HR2: I have someone who encourages me to follow the Covid-19 guidelines
 HR3: My friends encourage me to follow the Covid-19 guidelines

Counter conditioning (CC)
 CC1: When I do not feel like it, I make myself follow the Covid-19 guidelines because I know I will feel better afterward
 CC2: Instead of living a pre-pandemic lifestyle, I follow the Covid-19 guidelines
 CC3: Instead of carelessly living my life I follow the Covid-19 guidelines

Reinforcement management (RM)
 RM1: One of the rewards of following the Covid-19 guidelines is that it makes me feel better
 RM2: I try to think of following the Covid-19 guidelines as a way to stay healthy
 RM3: If I follow the Covid-19 guidelines, I find that I get the benefit of staying healthy

Stimulus control (SC)
 SC1: I keep a set of personal hygienic equipment conveniently located, so I can use them whenever needed
 SC2: I set reminders to follow the Covid-19 guidelines
 SC3: I make sure I always have a set of personal hygienic equipment

Self-efficacy (SE)
 SE1: I have access to personal hygienic equipment
 SE2: I am under a lot of stress to follow the Covid-19 guidelines. *
 SE3: I believe I have the ability to follow the Covid-19 guidelines
 SE4: I am spending time with people who do not follow the Covid-19 guidelines. *
 SE5: I feel I have the self-discipline to follow the Covid-19 guidelines

Notes: ¹* Deleted item, ² All constructs sourced from Blaney et al. (2012)

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